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PERIDERMIUM CEREBRUM PECK AND CRONARTIUM QUERCUUM (BERK.)*

C. L. SHEAR.

The recent work of Klebahn,[1] Ed. Fischer,[3] and Shirai [2] on certain species of *Peridermium* and their relation to *Cronartium* naturally suggests the probable connection of our American species. The common occurrence of *P. cerebrum* on trunks and branches of *Pinus Virginiana* about Washington and also the abundance of *Cronartium Quercuum* (Berk.) on oaks in the same vicinity led to the suspicion that a connection existed between these two forms.

With a view of obtaining some more definite light on the subject, some outdoor inoculations were made in the spring of 1902 by applying the aecidiospores of *Peridermium cerebrum* to the leaves of *Quercus Prinus, Q. alba* and *Q. coccinea.* The inoculations were made just about sundown on the evening of May 1, twelve marked leaves being used in each case. No infection took place in the case of *Q. Prinus* and *Q. alba,* which are usually entirely free from the fungus in this vicinity.

On May 12 uredo sori were found on the under surface of the infected leaves of *Q. coccinea,* as follows:

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*Read before the American Mycological Society. New Orleans, Jan. 1, 1906.

[1] Deutsch Bot. Gesell. **8**, 1890, 61, and later papers.

[2] Beiträge Krypt. Schweiz. **1**, 1898, 90, and elsewhere.

[3] Bot. Mag. **13**, 1899, 74.

No. 1	20
No. 2	17
No. 3	72
No. 4	62
No. 5	3
No. 6	3
No. 7	2
No. 8	11
No. 9	116
No. 10	20
No. 11	28
No. 12	0

On May 18 the cylindrical brown masses of teleutospores were found arising from many of the uredo sori. The surrounding uninoculated leaves on the same tree showed at this time an occasional uredo sorus, varying from one to three on a few of the leaves, but no signs of teleutospores were yet to be found. This seemed to indicate that infection had taken place later in the case of the natural inoculations than in the case of the artificial ones.

This experiment, conducted in the open woods where there was possibility or perhaps probability of infection from other sources is, of course, not conclusive. The large number of sori occurring on most of the artificially inoculated leaves as compared with the very small number found on the surrounding ones, taken in connection with their much earlier appearance, seems however to indicate a genetic relation between these forms.

Other attempts to produce artificial infection undertaken during the middle of the day failed, but later experiments made in the evening were apparently successful, as numerous sori of the *Cronartium* developed on the inoculated leaves and few or none on those uninoculated. Unfortunately, we have not thus far had opportunity to carry out artificial inoculation experiments under conditions which would preclude the possibility of infection from any other source.

As bearing upon the probability of the genetic relation of these two forms, additional evidence is furnished by the following observations: On May 17, 1903, a small tree of *Pinus Virginiana,* about five feet high, was found having a large spore-bearing excrescence of *Peridermium cerebrum* on its trunk about one foot from the ground. About two feet away two seedling oaks were growing, one *Quercus Marylandica* and the other *Q. Prinus,* bearing about a dozen leaves each. Most of the leaves on both of these plants had their under surfaces almost literally covered with the uredo sori of *Cronartium Quercuum,* and many showed teleutospores forming. We have been unable to find any record of the fungus occurring on *Q. Prinus* and have never found it ourselves except in this instance, in spite of diligent search in various localities where the *Peridermium* is found, but not in such close proximity to the oak, and we have never seen it on any host in such great abundance as it was on these two plants. The sori were not quite so numerous and well developed on the *Q. Prinus* as on *Q. Marylandica,* which is a normal and common host of the fungus.

Shirai[4] has, according to Klebahn[5], proven by successful inoculation of seedling oaks (*Quercus serrata, Q. variabilis* and *Q. glandulifera*) the connection between *Cronartium gigantium* (Mayr) Tubeuf and what he calls *Cronartium Quercuum* (Cooke) Miyabe. Whether this *Cronartium,* which occurs on the oaks in Japan, is identical with the plant occurring on our oaks we are unable to say, not having had an opportunity to examine Japanese specimens. The authority given by Tubeuf for *Cronartium Quercuum* is also (Cooke) Miyabe.

The American plant was first described, so far as we can learn, by Berkeley[6] in 1874 as *Cronartium Asclepiadeum Quercuum,* collected on *Quercus nigra* in South Carolina and on *Q. velutina* in Pennsylvania. We find no description of the plant by Cooke.

In regard to *Peridermium gigantium* (Mayr) Tubeuf, this was first described or mentioned at least by H. Mayr as *Aecidium gigantium* and transferred to *Peridermium* by Tubuef[7]. It is reported as occurring on *Pinus desiora, P. Thunbergi, P. parviflora* and *P. Linckuensis* in Japan. We had an opportunity during the past summer, through the kindness of Prof. Tubeuf, to examine the Japanese specimens of this fungus upon which his figures of the plant are based and which are preserved in the collection of the Forestry Institute at Munich. The specimens are identical in appearance with those collected on *Pinus Virginiana* in the vicinity of Washington. Moreover, the sweet sap containing spermatia, which is said to exude from the surface of the swellings produced by the fungus in Japan, is equally characteristic of our plant. We are, therefore, of the opinion that *Peridermium gigantium* (Mayr) Tubeuf is the same as *P. cerebrum* Peck, which was described many years before the Japanese plant. Though the matter can not be regarded as settled, all the evidence at hand at present points to the idenity of these plants and their genetic connection with the uredo and teleutospore stages which occur on various species of oak and which are known as *Cronartium Quercuum.*

It may be interesting to add a list of species of pine and oak upon which the two forms have been found in this country.

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[4] l. c.

[5] Die Wirtswechselnden Rostpilse, 1904, p. 381.

[6] Grevillea, 1874, **3**, 59.

[7] Pflanzenkrankheiten durch Kryptogame Parasiten verursacht, 1895, p. 429.

Peridermium cerebrum.

The original specimens from New York were on *Pinus rigida.* It has also been collected on this host in New Jersey by Ellis (N. A. F. No. 1022) and by the writer. It is reported in Farlow and Seymour's "Host Index" as occurring on *P. ponderosa.* In Mohr's "Plant Life of Alabama" it is reported on *P. taeda, P. echinata* and *P. Virginiana.* There are specimens of a *Peridermium* from Mississippi and Texas in the pathological collection of the Bureau of Plant Industry, Department of Agriculture, which also appear to belong to this species. Its distribution, according to the records and specimens at hand, is from New York to Texas.

Cronartium Quercuum.

This is given by Farlow and Seymour as occurring on the following oaks: *Quercus coccinea, Q. nigra, Q. tinctoria - Q. velutina,* and *Q. virens-Q. virginiana.* There are specimens in the pathological collections of the Department of Agriculture on *Q. velutina, Q. Virginiana, Q. coccinea* and *Q. macrocarpa* (Fun. Col. No. 198). We have found it about Washington on *Quercus velutina, Q. coccinea, Q. Marylandica, Q. Phellos* and *Q. Prinus.* We have collected it in New Jersey on all the species last mentioned, except *Q. Prinus,* and also on the following additional species not before reported: *Q. alba, Q. digitata, Q. nana* and *Q. minor.* Its distribution, so far as indicated by the specimens seen, is from Pennsylvania and New Jersey to Mississippi and Texas. There are also specimens from Minnesota. Of course, if the connection between these two forms is correct, their distribution should be practically identical.

NORTH AMERICAN SPECIES OF HELIOMYCES.

A. P. MORGAN.

HELIOMYCES Le'ville Champ. exot. Am. Sc. Nat. 1844.

Pileus coriaceous - or membranaceous - tremellose, plicate-sulcate or rugulose. Stipe central, tough, cylindric, fistulose, Lamellae similar in substance to the pileus, the edge acute; spores white.

Small Agarics which are tremelloid when fresh and growing, and when dry have the appearance of Marasmii. Only about a dozen species have been described and these are very imperfectly known; the spores are recorded in but one or two species. The genus is certainly a very interesting one and worthy of the attention of students; but the species must be observed and described in their fresh and growing state, since they change their appear-